WHAT IS CLAIMED IS

1. A method of manufacturing a semiconductor device, comprising the steps of:

forming a gate oxide film on a substrate;

forming gate interconnections on the gate oxide film, each gate interconnection including a first silicon film and a dielectric film;

forming a first diffusion layer by means of implanting an impurity into the substrate while the gate interconnections are taken as a mask;

forming a second silicon film over the entire surface of the substrate so as to cover the gate interconnections, after formation of the first diffusion layer;

thermally-oxidizing the second silicon film, thereby forming a thermal oxide film; and

forming an interlayer dielectric film on the thermal oxide film.

2. The method of manufacturing a semiconductor device according to claim 1, wherein each of the gate interconnections includes a silicide film interposed between the first silicon film and the dielectric film.

3. The method of manufacturing a semiconductor device according to claim 1, wherein the first silicon film is a doped silicon film, and

the second silicon film is formed at a temperature higher than 700°C.

4. The method of manufacturing a semiconductor device according to claim 1, wherein the second silicon film is a doped silicon film.

5. The method of manufacturing a semiconductor device according to claim 1, further comprising a step of forming, after formation of the thermal oxide film and prior to formation of the interlayer dielectric film, a second diffusion layer which is higher in impurity concentration than the first diffusion layer, by means of implanting an impurity into the substrate while the thermal oxide film is taken as a mask.

6. A method of manufacturing a semiconductor device, comprising the steps of:

forming a gate oxide film on a substrate;

forming gate interconnections on the gate oxide film, each gate interconnection including a first silicon film and a dielectric film;

forming a first diffusion layer by means of implanting an impurity into the substrate while the gate interconnections are taken as a mask;

forming, after formation of the first diffusion layer, a second silicon film over the side surfaces of the first silicon film;

thermally-oxidizing the second silicon film, thereby forming a thermal oxide film; and

forming, after formation of the thermal oxide film, an interlayer dielectric film over the entire surface of the substrate so as to cover the gate interconnections.

7. The method of manufacturing a semiconductor device according to claim 6, wherein each of the gate interconnections includes a silicide film interposed between the first silicon film and the dielectric film, and

the second silicon film covers side surfaces of the first silicon film and those of the silicide.

8. The method of manufacturing a semiconductor device according

to claim 6, wherein the first silicon film is a doped silicon film, and

the second silicon film is formed at a temperature higher than 700°C.

9. The method of manufacturing a semiconductor device according to claim 6, wherein the second silicon film is a doped silicon film.

10. The method of manufacturing a semiconductor device according to claim 6, further comprising a step of forming, after formation of the thermal oxide film and prior to formation of the interlayer dielectric film, a second diffusion layer which is higher in impurity concentration than the first diffusion layer, by means of implanting an impurity into the substrate while the thermal oxide film is taken as a mask.

11. The method of manufacturing a semiconductor device according to claim 6, wherein in the step of thermally-oxidizing the second silicon film, the surface of the second silicon film is thermally-oxidized, thereby forming a layer of thermal oxide film and leaving a second silicon film between the layer of the thermal oxide film and the gate interconnections.

12. The method of manufacturing a semiconductor device according to claim 11, wherein one-third to two-thirds of the second silicon film is thermally oxidized, thereby forming the layer of the thermal oxide film.

13. The method of manufacturing a semiconductor device according to claim 1, wherein the second silicon film is thermally oxidized at a temperature of 700 to 1200°C.

14. The method of manufacturing a semiconductor device

according to claim 6, wherein the second silicon film is thermally oxidized at a temperature of 700 to 1200°C.

15. A semiconductor device comprising:

a substrate;

a gate oxide film formed on said substrate;

a plurality of gate interconnections which are formed on said gate oxide film, each of said gate interconnections including a first silicon film and a dielectric film;

an impurity diffusion layer formed in said substrate between said gate interconnections;

a thermal oxide film covering each of said gate electrodes; and

an interlayer dielectric film formed on said thermal oxide film;

wherein a side surface of the dielectric film and a side surface of the first silicon film constitute a single plane.

16. The semiconductor device according to claim 15, wherein each of the gate interconnections includes a silicide film interposed between the first silicon film and the dielectric film, and

a side surface of the dielectric film, a side surface of the first silicon film and a side surface of the silicide film constitute a single plane.

17. The semiconductor device according to claim 16, wherein said thermal oxide film covers only a side surface of the first silicon film constituting said gate interconnection and a side surface of the silicide film.

18. The semiconductor device according to claim 15, wherein said thermal oxide film covering the side surface of each of said gate interconnections has a uniform thickness.

19. The semiconductor device according to claim 16, wherein said thermal oxide film covering the side surface of the silicide film is thicker than said thermal oxide film covering the side surface of the first silicon film.

20. The semiconductor device according to claim 15, further comprising a second silicon film disposed between the side surface of said gate interconnection and the side surface of said thermal oxide film.